

**REMARKS**

The specification has been amended to reflect the 371 status. In addition, claim 5 has been amended so as to be divided into two separate claims, i.e. claim 5 is amended and claim 13. New claims 14-17 correspond to original claims 6-9, respectively.

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached pages are captioned "Version with markings to show changes made".

Favorable action on the merits is solicited.

Respectfully submitted,

Hiroaki INOUE et al.

By Warren M. Cheek, Jr.  
Warren M. Cheek, Jr.  
Registration No. 33,367  
Attorney for Applicants

WMC/dlk  
Washington, D.C. 20006-1021  
Telephone (202) 721-8200  
Facsimile (202) 721-8250  
August 1, 2001

09/890455

3/PRTS

## DESCRIPTION

ELECTROLESS PLATING LIQUID AND METHOD OF FORMING  
INTERCONNECTION USING SUCH AN ELECTROLESS PLATING LIQUID

*Inv*

5 **Technical Field**

The present invention relates to an electroless plating liquid and a method of forming an interconnection using such an electroless plating liquid, and more particularly to an electroless plating liquid for filling interconnection recesses defined in a semiconductor substrate with an interconnection forming metal such as copper, its alloy, or the like, and a method of forming an interconnection using such an electroless plating liquid.

15 **Background Art**

For forming interconnection circuits on semiconductor substrates, it has heretofore been customary to grow an aluminum or aluminum alloy film on a substrate surface according to sputtering or the like, and then remove unwanted portions from the film according to chemical dry etching using a pattern mask such as a resist. However, as the level of circuit integration increases, the width of interconnections decreases and the current density in the interconnections increases, causing thermal stresses and temperature rises. Therefore, the interconnections are liable to break due to stress migration or electromigration.

Copper which is lower in resistance and higher in reliability than aluminum or aluminum alloy has been drawing

concentration ranging from 0.01 to 10.0 g/L, said EDTA·4H  
has a concentration ranging from 0.5 to 100 g/L, said  
glyoxylic acid has a concentration ranging from 1 through 50  
g/L, and the electroless copper plating liquid has a pH  
5 adjusted to a range from 10 to 14 by said TMAH.

*Amended*

5/ 5. A method of forming a copper interconnection  
on a semiconductor device, characterized by the steps of  
forming an auxiliary seed layer for reinforcing a copper  
10 seed layer in an interconnection groove defined in a surface  
of the semiconductor device using an electroless copper  
plating liquid containing dihydric copper ions, a complexing  
agent, *and* an aldehyde acid, ~~and an organic alkali~~, and  
performing an electrolytic plating process using the seed  
15 layer including said auxiliary seed layer as a current  
feeding layer, for thereby filling copper in the  
interconnection groove defined in the surface of the  
semiconductor device.

20 6. A method of forming a copper interconnection  
according to claim 5, characterized by performing an  
electroless copper plating process at a plating rate of 50  
nm/min. or less using said electroless copper plating  
liquid.

25 7. A method of forming a copper interconnection  
according to claim 5, characterized in that said electroless  
copper plating liquid contains polyoxyethylene